

## WHAT IS CLAIMED IS:

1. A system for autostereoscopic vision comprising:
  - (a) a display for presenting left and right image picture elements of left and right images, respectively;
  - (b) a parallax barrier including a pair of polarizing filters and a birefringent layer being interposed therebetween, said birefringent layer having individually switchable elements each of which being switchable from a first light polarization mode to a second light polarization mode and vice versa, so as to create light opaque and light transparent portions in said parallax barrier, said parallax barrier being positioned between said display and a viewer having left and right eyes, so as to permit the left eye of the viewer to see left image picture elements of said display and the right eye of the viewer to see right image picture elements of said display, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image picture elements;
  - (c) a head-tracking sensor for providing information pertaining to a position of the left and the right eyes of the viewer;
  - (d) a control element for:
    - (i) controlling said individually switchable elements of said birefringent layer;
    - (ii) controlling regions of said display in which said left and right image picture elements of left and right images, respectively being displayed;said control element communicating with said head-tracking sensor such that, at any given time point, said control element controls said regions of said display in which said left and right image picture elements of left and right images, respectively, are displayed, and controls said individually switchable elements of said birefringent layer, so as to appropriately line up said transparent and opaque portions of said parallax barrier, the left and the right eyes of the viewer and said regions of said display in which said left and right image picture elements of left and right images, respectively are displayed, so as to permit the left eye of the viewer to see left image picture elements of said display and the right eye of the viewer to see right image picture elements of said display, and substantially

preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image picture elements, while the left and right eyes of the viewer change position in space.

2. The system of claim 1, wherein said light opaque portions of said parallax barrier are selected larger than said light transparent portions of said parallax barrier, so as to enlarge a space within which each of the right and left eyes of the viewer can be positioned without causing an appropriate eye of the viewer to receive less light from appropriate image picture elements, nor more light from an inappropriate image picture elements.

3. The system of claim 1, further comprising a feed-back device for monitoring said regions of said display in which said left and right image picture elements of left and right images, respectively, are displayed, said feed-back device communicating information to said control element.

4. A system for autostereoscopic vision comprising:
  - (a) a display for presenting left and right image picture elements of left and right images, respectively;
  - (b) a parallax barrier including a pair of polarizing filters and a birefringent layer being interposed therebetween, said birefringent layer having individually switchable elements each of which being switchable from a first light polarization mode to a second light polarization mode and vice versa, so as to create light opaque and light transparent portions in said parallax barrier, said parallax barrier being positioned between said display and a viewer having left and right eyes, so as to permit the left eye of the viewer to see left image picture elements of said display and the right eye of the viewer to see right image picture elements of said display, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image picture elements;
  - (c) a head-tracking sensor for providing information pertaining to a position of the left and the right eyes of the viewer;
  - (d) a control element for:
    - (i) controlling said individually switchable elements of said birefringent layer;

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(ii) controlling regions of said display in which said left and right image picture elements of left and right images, respectively being displayed, while, at the same time, leaving some regions in said display in which no left nor right image picture elements are displayed;  
said control element communicating with said head-tracking sensor such that, at any given time point, said control element controls:

- (i) said regions of said display in which said left and right image picture elements of left and right images, respectively, are displayed;
- (ii) said regions in said display in which no left nor right image picture elements are displayed; and
- (iii) said individually switchable elements of said birefringent layer, so as to appropriately line up said transparent and opaque portions of said parallax barrier, the left and the right eyes of the viewer and said regions of said display in which said left and right image picture elements of left and right images, respectively are displayed;  
so as to permit the left eye of the viewer to see left image picture elements of said display and the right eye of the viewer to see right image picture elements of said display, and substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image picture elements, while the left and right eyes of the viewer change position in space.

5. The system of claim 4, wherein said light opaque portions of said parallax barrier are selected larger than said light transparent portions of said parallax barrier, so as to enlarge a space within which each of the right and left eyes of the viewer can be positioned without causing an appropriate eye of the viewer to receive less light from appropriate image picture elements, nor more light from an inappropriate image picture elements.

6. The system of claim 4, further comprising a feed-back device for monitoring said regions of said display in which said left and right image picture elements of left and right images, respectively, are displayed and said regions in said display in which no left nor right image picture elements are displayed, said feed-back device communicating information to said control element.

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7. A system for autostereoscopic vision comprising:
  - (a) a display for presenting left and right image picture elements of left and right images, respectively;
  - (b) an optical construction being positioned between said display and a viewer having left and right eyes, so as to permit the left eye of the viewer to see left image picture elements of said display and the right eye of the viewer to see right image picture elements of said display, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image picture elements;
  - (c) a head-tracking sensor for providing information pertaining to a position of the left and the right eyes of the viewer;
  - (d) a control element for controlling regions of said display in which said left and right image picture elements of left and right images, respectively being displayed, while, at the same time, leaving some regions in said display in which no left nor right image picture elements are displayed, said control element communicating with said head-tracking sensor such that, at any given time point, said control element controls said regions of said display in which said left and right image picture elements of left and right images, respectively, are displayed.
8. The system of claim 7, further comprising:
  - (e) a feed-back device for monitoring said regions of said display in which said left and right image picture elements of left and right images, respectively, are displayed, said feed-back device communicating information to said control element so as to permit the left eye of the viewer to see left image picture elements of said display and the right eye of the viewer to see right image picture elements of said display, and substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image picture elements, while the left and right eyes of the viewer change position in space.
9. A system for autostereoscopic vision comprising:
  - (a) a display for presenting left and right image picture elements of left and right images, respectively;

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- (b) a optical construction so constructed, designed and positioned so as to permit a left eye of the viewer to see left image picture elements of said display and a right eye of the viewer to see right image picture elements of said display, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image picture elements;
- (c) a head-tracking sensor for providing information pertaining to a position of the left and the right eyes of the viewer; and
- (d) a control element communicating with said head-tracking sensor, said display and said optical construction for adapting a size of said left and right image picture elements of said left and right images and a size of areas of said optical construction to a distance of the viewer from the system.

10. A system for autostereoscopic vision comprising:

- (a) a display for presenting left and right image picture elements of left and right images, respectively;
- (b) a optical construction so constructed, designed and positioned so as to permit a left eye of the viewer to see left image picture elements of said display and a right eye of the viewer to see right image picture elements of said display, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image picture elements;
- (c) a head-tracking sensor for providing information pertaining to a position of the left and the right eyes of the viewer; and
- (d) a control element communicating with said head-tracking sensor and said optical construction for adapting a size of areas of said optical construction to a distance of the viewer from the system.

11. The system of claim 10, wherein said optical construction is a two-layer polarizing system.

12. A system for autostereoscopic vision comprising:

- (a) a display for presenting left and right image picture elements of left and right images, respectively;
- (b) an optical construction so constructed, designed and positioned so as to permit a left eye of the viewer to see left image picture

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elements of said display and a right eye of the viewer to see right image picture elements of said display, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image picture elements, said optical construction includes a pair of on and off switchable liquid crystal arrays; and

- (c) a control element communicating with said optical construction so as to alternately and out-of-phase switch on and off said pair of on and off switchable liquid crystal arrays, so as to reduce a flickering effect of the system.

13. A system for autostereoscopic vision comprising:

- (a) a display for presenting left and right image picture elements of left and right images, respectively;
- (b) a first optical construction so constructed, designed and positioned so as to permit a left eye of the viewer to see left image picture elements of said display and a right eye of the viewer to see right image picture elements of said display, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image picture elements, said first optical construction including a first birefringent layer having individually switchable elements;
- (c) a second optical construction including a second birefringent layer having individually switchable elements so constructed, designed and positioned so as to generate opaque regions coaligned with elements of transitions of said first optical construction and the eyes of the viewer;
- (d) a head-tracking sensor for providing information pertaining to a position of the left and the right eyes of the viewer; and
- (e) a control element communicating with said head-tracking sensor, with said first optical construction and said second optical construction so as to generate opaque regions coaligned with elements of transitions of said first optical construction and the eyes of the viewer.

14. The system of claim 13, wherein said control element is further for controlling a size and position of said left and right image picture elements on said display.

15. A system for autostereoscopic vision comprising:

- (a) a display for presenting left and right image picture elements of left and right images, respectively;
- (b) a first optical construction so constructed, designed and positioned so as to permit a left eye of the viewer to see left image picture elements of said display and a right eye of the viewer to see right image picture elements of said display, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image picture elements, said first optical construction having individually switchable elements;
- (c) a second optical construction including a birefringent layer having individually switchable elements so constructed, designed and positioned so as to generate opaque regions coaligned with elements of transitions of said first optical construction and the eyes of the viewer;
- (d) a head-tracking sensor for providing information pertaining to a position of the left and the right eyes of the viewer; and
- (e) a control element communicating with said head-tracking sensor, with said first optical construction and said second optical construction so as to generate opaque regions coaligned with elements of transitions of said first optical construction and the eyes of the viewer.

16. A system for autostereoscopic vision comprising:

- (a) a display for presenting superimposed left and right image picture elements of left and right images, respectively, said display being designed so as to polarize superimposed light of said left image differently from superimposed light of said right image and further so as to differently polarize light of said left image being displayed in adjacent picture elements and differently polarize light of said right image being displayed in adjacent picture elements; and
- (b) an optical construction so constructed, designed and positioned so as to permit a left eye of the viewer to see left imagery data of said

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display and a right eye of the viewer to see right imagery data of said display, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image.

17. A system for autostereoscopic vision comprising:
  - (a) first and second displays for presenting left and right image picture elements of left and right images, said first and second displays polarizing light in different polarization orientations;
  - (b) an optical construction so constructed, designed and positioned so as to permit a left eye of the viewer to see left imagery data of said displays and a right eye of the viewer to see right imagery data of said displays, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image; and
  - (c) a beam splitter for directing light arriving from said first and second displays to said optical construction.
18. The system of claim 17, further comprising:
  - (d) a head-tracking sensor for providing information pertaining to a position of the left and the right eyes of the viewer; and
  - (e) a control element communicating with said head-tracking sensor and said optical construction so as to permit the left eye of the viewer to see said left imagery data and the right eye of the viewer to see said right imagery data of said first and second displays, while substantially preventing each of the right and left eyes of the viewer from seeing said light from an inappropriate image, while the viewer moves.
19. A system for autostereoscopic vision comprising:
  - (a) first and second displays for presenting left and right image picture elements of left and right images, said first and second display polarizing light in different polarization orientations and one of said left and right images being displayed as a mirror image of the other;
  - (c) a beam splitter for directing light arriving from said first and second displays to an optical construction for providing autostereoscopic vision.

20. A system for autostereoscopic vision comprising:
  - (a) first and second projectors for projecting left and right image picture elements of left and right images, said first and second projectors polarizing light in different polarization orientations;
  - (b) a translucent screen maintaining a degree of polarization of polarized light being projected thereon for presenting said left and right imagery data; and
  - (c) an optical construction so constructed, designed and positioned so as to permit a left eye of the viewer to see left imagery data of said screen and a right eye of the viewer to see right imagery data of said screen, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image.
21. The system of claim 20, further comprising:
  - (d) a head-tracking sensor for providing information pertaining to a position of the left and the right eyes of the viewer; and
  - (e) a control element communicating with said head-tracking sensor and said optical construction so as to permit the left eye of the viewer to see said left imagery data and the right eye of the viewer to see said right imagery data of said first and second projectors, while substantially preventing each of the right and left eyes of the viewer from seeing said light from an inappropriate image, while the viewer moves.
22. A system for autostereoscopic vision comprising:
  - (a) a projector for alternately projecting left and right image picture elements of left and right images, said projector polarizing light in different polarization orientations for said left and right image picture elements of said left and right images;
  - (b) a translucent screen maintaining a degree of polarization of polarized light being projected thereon for presenting said left and right imagery data; and
  - (c) an optical construction so constructed, designed and positioned so as to permit a left eye of the viewer to see left imagery data of said screen and a right eye of the viewer to see right imagery data of said screen, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image.

23. The system of claim 22, further comprising:
  - (d) a head-tracking sensor for providing information pertaining to a position of the left and the right eyes of the viewer; and
  - (e) a control element communicating with said head-tracking sensor and said optical construction so as to permit the left eye of the viewer to see said left imagery data and the right eye of the viewer to see said right imagery data of said projector, while substantially preventing each of the right and left eyes of the viewer from seeing said light from an inappropriate image, while the viewer moves.
24. The system of claim 23, wherein said projector includes a time controlled birefringent element having individually switchable elements for creating light opaque and light transparent portions in said optical construction, said control element is further for controlling said time controlled birefringent element.
25. A system for stereoscopic vision comprising:
  - (a) a display for displaying a uniformly polarized combined image of left and right image picture elements of left and right images; and
  - (b) a birefringent layer having individually switchable elements being positioned in front of said display and serving for re-dividing said uniformly polarized combined image by controlled partial light rotation.
26. The system of claim 25, wherein said controlled partial light rotation is effected by controlled degree of light rotation.
27. The system of claim 25, wherein said controlled partial light rotation is effected by controlled time periods of light rotation.
28. The system of claim 25, wherein said controlled partial light rotation is effected by both controlled degree of light rotation and controlled time periods of light rotation.
29. The system of claim 25, wherein said display is a projection.

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30. The system of claim 25, further comprising a lens element for focusing light from said display onto said birefringent layer.

31. The system of claim 25, wherein said display includes a rear and remote light source producing homogenous light rays.

32. A system for autostereoscopic vision comprising:

- (a) a display for displaying a uniformly polarized combined image of left and right image picture elements of left and right images; and
- (b) a birefringent layer having individually switchable elements being positioned in front of said display and serving for re-dividing said uniformly polarized combined image by controlled partial light rotation, thereby constructing an image having superimposed left and right image picture elements of left and right images, respectively, in which superimposed light of said left image is polarized differently from superimposed light of said right image, light of said left image displayed in adjacent picture elements is polarized differently and light of said right image displayed in adjacent picture elements is polarized differently.

33. The system of claim 32, further comprising:

- (c) an optical construction so constructed, designed and positioned so as to permit a left eye of the viewer to see left imagery data of said display and a right eye of the viewer to see right imagery data of said display, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image.

34. The system of claim 33, wherein said display is a projection.

35. The system of claim 33, wherein said display is a back-projection on a translucent screen.

36. The system of claim 33, wherein said display includes a rear and remote light source producing homogenous light rays.

37. A display for stereoscopic or autostereoscopic viewing, the display is designed and controlled to present a combined image of left and right image picture elements of left and right images.

38. A system for autostereoscopic vision comprising:

- (a) a display for displaying left and right intermixed image sub-picture elements of left and right images, respectively, each of said sub-picture elements is of a specified color range; and
- (b) a filter so constructed, designed and positioned so as to permit a left eye of the viewer to see left image sub-picture elements and a right eye of the viewer to see right image sub-picture elements of said left and right images, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image, said filter including an array of a plurality of light filtering elements, each of said plurality of light filtering elements being substantially transparent to a specified color range or ranges and substantially opaque to another specified color range or ranges.

39. The system of claim 38, further comprising a control element for controlling a distribution of at least one of said left and right intermixed image sub-picture elements of left and right images and said plurality of light filtering elements, so as to permit the left eye of the viewer to see said left image sub-picture elements and the right eye of the viewer to see said right image sub-picture elements of said left and right images, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image, thereby allowing autostereoscopically viewing of motion pictures.

40. An autostereoscopic vision device comprising:

- (a) a display displaying in fixed positions left and right intermixed image sub-picture elements of left and right images, respectively, each of said sub-picture elements is of a specified color range; and
- (b) a filter so constructed, designed and positioned so as to permit a left eye of a viewer to see left image sub-picture elements and a right eye of the viewer to see right image sub-picture elements of said left and right images, while substantially preventing each of the right and left eyes of the viewer from seeing light from an

inappropriate image, said filter including an array of a plurality of light filtering elements in fixed positions, each of said plurality of light filtering elements being substantially transparent to a specified color range or ranges and substantially opaque to another specified color range or ranges.

41. A system for autostereoscopic vision comprising:
  - (a) first and second projectors for projecting left and right image picture elements of left and right images, respectively;
  - (b) a translucent screen;
  - (c) a first filter so constructed, designed and positioned between said first and second projectors and said translucent screen so as to create on said translucent screen a display displaying left and right intermixed image sub-picture elements of said left and right images, respectively, each of said sub-picture elements is of a specified color range, said filter including a first array of a plurality of light filtering elements, each of said plurality of light filtering elements of said first array being substantially transparent to a specified color range and substantially opaque to another specified color range; and
  - (d) a second filter so constructed, designed and positioned between a viewer and said first filter so as to permit a left eye of the viewer to see left image sub-picture elements and a right eye of the viewer to see right image sub-picture elements of said left and right images, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image, said filter including a second array of a plurality of light filtering elements, each of said plurality of light filtering elements of said second array being substantially transparent to said specified color range or ranges and substantially opaque to said another specified color range or ranges.
42. A system for autostereoscopic vision comprising:
  - (a) first and second projectors for projecting left and right image picture elements of left and right images, respectively;
  - (b) a reflective screen;
  - (c) a filter so constructed, designed and positioned between said first and second projectors and said reflective screen so as to create on

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said reflective screen a display displaying left and right intermixed image sub-picture elements of said left and right images, respectively, each of said sub-picture elements is of a specified color range, and further so as to permit a left eye of the viewer to see left image sub-picture elements and a right eye of the viewer to see right image sub-picture elements of said left and right images, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image, said filter including an array of a plurality of light filtering elements, each of said plurality of light filtering elements being substantially transparent to a specified color range or ranges and substantially opaque to another specified color range or ranges.

43. A projection screen comprising a sheet having a plurality of colored strips, colored strips of said plurality of colored strips of a specified color reflecting or scattering light of a unique color range and absorbing light of other color ranges.

44. A back projection screen comprising a sheet having a plurality of colored strips, wherein colored strips of said plurality of colored strips of a specified color transmitting light of a unique color range and absorbing or scattering light of other color ranges.

45. A system for autostereoscopic vision comprising:

- (a) first and second projectors for projecting left and right image picture elements of left and right images, respectively;
- (b) a reflective screen having a plurality of colored strips, colored strips of said plurality of colored strips of a specified color reflecting or scattering light of a unique color range and absorbing light of other color ranges; and
- (c) a filter so constructed, designed and positioned so as to permit a left eye of a viewer to see left image sub-picture elements and a right eye of the viewer to see right image sub-picture elements of said left and right images, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image, said filter including an array of a plurality of light filtering elements, each of said plurality of light filtering

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elements being substantially transparent to a specified color range or ranges and substantially opaque to other specified color ranges.

46. A system for autostereoscopic vision comprising:

- (a) a projector for projecting intermixed left and right image sub-picture elements of left and right images, respectively;
- (b) a reflective screen; and
- (c) a filter so constructed, designed and positioned between said projector and said reflective screen so as to create on said reflective screen a display displaying left and right intermixed image sub-picture elements of said left and right images, respectively, each of said sub-picture elements is of a specified color range, and further so as to permit a left eye of the viewer to see left image sub-picture elements and a right eye of the viewer to see right image sub-picture elements of said left and right images, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image, said filter including an array of a plurality of light filtering elements, each of said plurality of light filtering elements being substantially transparent to said specified color range or ranges and substantially opaque to said another specified color range or ranges.

47. An electronic display for use with autostereoscopic systems, the electronic display comprising a screen for displaying intermixed left and right picture elements of left and right images and being controlled by a control element for exchanging positions in which said intermixed left and right picture elements of said left and right images are displayed in accordance with a movement of a viewer with respect to the display so as to maintain autostereoscopic viewing.

48. An electronic display for use with autostereoscopic systems, the electronic display comprising a screen for displaying intermixed left and right sub-picture elements of left and right images and being controlled by a control element for exchanging positions in which said intermixed left and right sub-picture elements of said left and right images are displayed in accordance with a movement of a viewer with respect to the display so as to maintain autostereoscopic viewing.

49. A system for autostereoscopic vision comprising:
  - (a) a display for displaying left and right image picture elements of left and right images, respectively;
  - (b) an optical construction so constructed, designed and positioned so as to permit a left eye of a viewer to see left imagery data and a right eye of the viewer to see right imagery data of said display, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image; and
  - (c) a head-tracking sensor for providing information pertaining to a position of the left and the right eyes of the viewer; and
  - (d) an arrangement for translating either said display or said optical construction or filter between two discrete positions, so as to compensate for movement of the viewer.

50. The system of claim 49, wherein translating either said display or said optical construction or filter between two discrete positions is effected electronically.

51. The system of claim 49, wherein translating either said display or said optical construction or filter between two discrete positions is effected mechanically.

52. A system for autostereoscopic display comprising:
  - (a) an arrangement for directing left image data to a left eye of a viewer and right image data to a right eye of the viewer or alternatively directing monoscopic image data to both eyes of the viewer;
  - (b) a head-tracking sensor for providing information pertaining to sudden and rapid movements of the viewer; and
  - (c) an electronic control element communicating with said head-tracking sensor and said arrangement so as to electronically instruct said arrangement of directing monoscopic image data to both eyes of the viewer when a sudden and rapid movement of the viewer is detected by said head-tracking sensor.

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53. A system for autostereoscopic display comprising:
  - (a) an arrangement for displaying and directing left image data to a left eye of a viewer and right image data to a right eye of the viewer;
  - (b) a head-tracking sensor for providing information pertaining to a position of the left and the right eyes of the viewer; and
  - (c) an electronic control element communicating with said head-tracking sensor and said arrangement so as to electronically instruct said arrangement of directing left image data to a left eye of a viewer and right image data to a right eye of the viewer when the viewer moves to a position where otherwise said arrangement would be directing left image data to the right eye of the viewer and right image data to the left eye of the viewer.
  
54. A system for autostereoscopic display comprising:
  - (a) an electronic display including a screen for displaying alternating vertical stripes of left image picture elements and of right image picture elements of left and right images, respectively, each of said stripes being repositionable on said screen in a substantially continuous fashion, so as to effect repositioning of said left image picture elements and said right image picture elements in a non-discrete fashion;
  - (b) an optical construction so constructed, designed and positioned so as to permit a left eye of the viewer to see left imagery data of said electronic display and a right eye of the viewer to see right imagery data of said electronic display, while substantially preventing each of the right and left eyes of the viewer from seeing light from an inappropriate image;
  - (c) a head-tracking sensor for providing information pertaining to a position of the left and the right eyes of the viewer; and
  - (d) an electronic control element communicating with said head-tracking sensor and said electronic display so as to electronically instruct said display to direct left image data to the left eye of the viewer and right image data to the right eye of the viewer when the viewer moves.

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55. A method of displaying a display for autostereoscopic viewing, the method comprising the step of displaying left image sub-picture elements and right image sub-picture elements of left and right images, respectively, such that at least one picture element of said display represents at least one left image sub-picture element and at least one right image sub-picture element.